

Ravi Chugh | CV

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Research Interests

Programming Languages, Software Engineering, Human-Computer Interaction

Functional Programming, Program Synthesis and Repair, Refactoring, Structure Editors, Graphical User Interfaces

Education

University of California, San Diego, La Jolla, CA 2013

Ph.D., Computer Science

Dissertation Title: "Nested Refinement Types for JavaScript"

Dissertation Advisor: Ranjit Jhala

University of Pennsylvania, Philadelphia, PA 2007

M.S.E., B.S.E., Computer Science

Graduated *summa cum laude*.

Appointments

University of Chicago, Chicago, IL 2014 – present

Associate Professor, Department of Computer Science

Assistant Professor, Department of Computer Science

starting July 2021

2014 – present

University of California, San Diego, La Jolla, CA 2007 – 2014

Postdoctoral Scholar

Graduate Student Researcher and Teaching Assistant

2013 – 2014

2007 – 2013

Mozilla, San Francisco, CA 2012

Research Intern

Microsoft, Redmond, WA 2005, 2006, 2009

Program Manager Intern, Software Design Engineer Intern, Research Intern

University of Pennsylvania, Philadelphia, PA 2004 – 2007

Teaching Assistant

Academic Honors

National Science Foundation 2017

CAREER Award

University of Chicago 2015

Neubauer Faculty Fellowship (undergraduate teaching award)

Grants

University of Chicago, College Innovation Fund 2021 – 2022

Enhancing the Programming Tools and Curriculum for CMSC 11111: Creative Coding

\$16,000

National Science Foundation, Award 2011353 2020 – 2021

I-Corps: Software Platform to Bridge the Gap Between Code Editors and Visual Editors

\$50,000

Project led by Mikael Mayer and Aseem Bhardwaj

National Science Foundation, Award 1814900 2018 – 2021

SHF: Small: Collaborative Research: Semantic Foundations for Hole-Driven Development

~\$250,000 / ~\$500,000

Co-PIs: Cyrus Omar (University of Michigan) and Ben Shapiro (University of Colorado, Boulder)

National Science Foundation , Award 1651794 <i>CAREER: Direct Manipulation Programming Systems</i>	2017 – 2022 ~\$525,000
National Science Foundation , Award 1654961 <i>Midwest Programming Languages Summit 2016</i>	2016 \$5,000
University of Chicago <i>College Research Fellows Grant</i>	2015 \$3,000

Conference and Journal Publications

Filling Typed Holes with Live GUIs Cyrus Omar, David Moon, Andrew Blinn, Ian Voysey, Nick Collins, and Ravi Chugh In <i>ACM SIGPLAN Conference on Programming Language Design and Implementation</i> Virtual Conference, June 2021	PLDI 2021
Integrated Visualization Editing via Parameterized Declarative Templates Andrew McNutt and Ravi Chugh In <i>Proceedings of the Conference on Human Factors in Computing Systems</i> Virtual Conference, May 2021	CHI 2021
Program Sketching with Live Bidirectional Evaluation Justin Lubin, Nick Collins, Cyrus Omar, and Ravi Chugh In <i>Proceedings of the ACM on Programming Languages (PACMPL)</i> , Issue ICFP Jersey City, NJ, August 2020	ICFP 2020
Tiny Structure Editors for Low, Low Prices! (Generating GUIs from toString Functions) Brian Hempel and Ravi Chugh In <i>IEEE Symposium on Visual Languages and Human-Centric Computing</i> Dunedin, New Zealand, August 2020	VL/HCC 2020
Sketch-n-Sketch: Output-Directed Programming for SVG Brian Hempel, Justin Lubin, and Ravi Chugh In <i>ACM Symposium on User Interface Software and Technology</i> New Orleans, LA, October 2019	UIST 2019
Live Functional Programming with Typed Holes Cyrus Omar, Ian Voysey, Ravi Chugh, and Matthew A. Hammer In <i>Proceedings of the ACM on Programming Languages (PACMPL)</i> , Issue POPL Lisbon, Portugal, January 2019	POPL 2019
Bidirectional Evaluation with Direct Manipulation Mikaël Mayer, Viktor Kunčák, and Ravi Chugh In <i>Proceedings of the ACM on Programming Languages (PACMPL)</i> , Issue OOPSLA Boston, MA, November 2018	OOPSLA 2018
Deuce: A Lightweight User Interface for Structured Editing Brian Hempel, Justin Lubin, Grace Lu, and Ravi Chugh In <i>IEEE/ACM International Conference on Software Engineering</i> Gothenburg, Sweden, May 2018	ICSE 2018
Semi-Automated SVG Programming via Direct Manipulation Brian Hempel and Ravi Chugh In <i>ACM Symposium on User Interface Software and Technology</i> Tokyo, Japan, October 2016 Featured in “Research for Practice,” <i>ACM Queue</i> (Jan/Feb 2017) and <i>CACM</i> (Jul 2017)	UIST 2016
Programming and Direct Manipulation, Together at Last Ravi Chugh, Brian Hempel, Mitchell Spradlin, and Jacob Albers In <i>ACM SIGPLAN Conference on Programming Language Design and Implementation</i> Santa Barbara, CA, June 2016	PLDI 2016
Prodirect Manipulation: Bidirectional Programming for the Masses Ravi Chugh In <i>IEEE/ACM International Conference on Software Engineering Companion, Visions of 2025 and Beyond (V2025)</i> Austin, TX, May 2016	ICSE-C 2016

IsoLate: A Type System for Self-Recursion Ravi Chugh In <i>European Symposium on Programming</i> London, UK, April 2015	ESOP 2015
Dependent Types for JavaScript Ravi Chugh, David Herman, and Ranjit Jhala In <i>ACM SIGPLAN Conference on Object-Oriented Programming Systems, Languages, and Applications</i> Tucson, AZ, October 2012	OOPSLA 2012
Nested Refinements: A Logic for Duck Typing Ravi Chugh, Patrick M. Rondon, and Ranjit Jhala In <i>ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages</i> Philadelphia, PA, January 2012	POPL 2012
Type-Preserving Compilation for End-to-End Verification of Security Enforcement Juan Chen, Ravi Chugh, and Nikhil Swamy In <i>ACM SIGPLAN Conference on Programming Language Design and Implementation</i> Toronto, Canada, June 2010	PLDI 2010
Enforcing Stateful Authorization and Information Flow Policies in Fine Nikhil Swamy, Juan Chen, and Ravi Chugh In <i>European Symposium on Programming</i> Paphos, Cyprus, March 2010	ESOP 2010
Staged Information Flow for JavaScript Ravi Chugh, Jeffrey A. Meister, Ranjit Jhala, and Sorin Lerner In <i>ACM SIGPLAN Conference on Programming Language Design and Implementation</i> Dublin, Ireland, June 2009	PLDI 2009
Dataflow Analysis for Concurrent Programs using Datarace Detection Ravi Chugh, Jan W. Voung, Ranjit Jhala, and Sorin Lerner In <i>ACM SIGPLAN Conference on Programming Language Design and Implementation</i> Tucson, AZ, June 2008	PLDI 2008

Workshop Publications

Type-Directed Program Transformations for the Working Functional Programmer Justin Lubin and Ravi Chugh In <i>Workshop on Evaluation and Usability of Programming Languages and Tools</i> New Orleans, LA, October 2019	PLATEAU 2019
A Bidirectional Krivine Evaluator Mikaël Mayer and Ravi Chugh In <i>International Workshop on Bidirectional Transformations</i> Philadelphia, PA, June 2019	Bx 2019

Unpublished Workshop Papers and Manuscripts

Delta Dictionaries: Total and Extensional Finite Maps in Proof Assistants Nick Collins, Ian Voysey, and Ravi Chugh September 2020	Manuscript, 2020
Livelits: Filling Typed Holes with Live GUIs (Extended Abstract) Cyrus Omar, Nick Collins, David Moon, Ian Voysey, and Ravi Chugh In <i>Workshop on Type-Driven Development</i> Berlin, Germany, August 2019	TyDe 2019
Predicting Haskell Type Signatures From Names Bowen Wang, Brian Hempel, and Ravi Chugh September 2018	Manuscript, 2018

Direct Manipulation Programming Systems (A Brief Introduction)

White Paper, 2017

Ravi Chugh

In *ISAT/DARPA "Augmented Developers: Tools for Hybrid Man-Machine Software Engineering" Workshop*
Arlington, VA, February 2017

A Fix for Dynamic Scope

ML 2013

Ravi Chugh

In *ACM Workshop on ML*
Boston, MA, September 2013

Status Report: Dependent Types for JavaScript

STOP 2012

Ravi Chugh, David Herman, and Ranjit Jhala

In *Workshop on Script to Program Evolution*
Beijing, China, June 2012

Type Inference with Run-time Logs

STOP 2011

Ravi Chugh, Ranjit Jhala, and Sorin Lerner

In *Workshop on Script to Program Evolution*
Austin, TX, January 2011

Presentations

Reimagining the User Interfaces for Programming

University of Louisiana, Lafayette
Microsoft Research, Cambridge
University of Chicago

March 26, 2021
March 17, 2021
October 2, 2020

Everyday Coding with Graphical User Interfaces

Illinois Ignite, ~~Chicago, IL~~

Recorded August 27, 2020

Sketch-n-Sketch

Future of Coding Podcast, Episode 49 (March 2021)

Interviewed January 29, 2020

Bidirectional Programming with Direct Manipulation

Princeton University, Princeton, NJ
University of Pennsylvania, Philadelphia, PA
Purdue University, West Lafayette, IN
University of California, Los Angeles, CA
University of California, San Diego, CA
University of California, Berkeley, CA
Carnegie Mellon University, Pittsburgh, PA
Northwestern University (Invited Seminar), Evanston, IL

November 8, 2019
November 7, 2019
October 16, 2019
October 11, 2019
October 9, 2019
October 8, 2019
September 4, 2019
May 22, 2019

Programming with Direct Manipulation in Sketch-n-Sketch: Three Years, Three Ideas

PLATEAU (Invited Keynote), Boston, MA

November 5, 2018

Direct Manipulation Programming in Sketch-n-Sketch

ICFP Tutorials, St. Louis, MO (with Collins, Hempel, Lubin, and Mayer)

September 27, 2018

Structured Editing for Elm* in Elm

elm-conf, St. Louis, MO

September 26, 2018

Direct Manipulation Programming Systems

SPLASH-I, Vancouver, Canada
University of Wisconsin, Madison, WI
University of Maryland, College Park, MD
University of Washington, Seattle, WA

October 25, 2017
June 5, 2017
February 20, 2017
January 11, 2017

Interactive SVG Programming with Direct Manipulation

Strange Loop, St. Louis, MO

September 17, 2016

Prodirect Manipulation: Bidirectional Programming for the Masses

ICSE, Austin, TX

May 19, 2016

Program Synthesis for Direct Manipulation Interfaces

MIT, Cambridge, MA
Harvard University, Cambridge, MA
ECOOP PC Meeting, Brown University, Providence, RI
PADL (Invited Talk), St. Petersburg, FL
Midwest PL Summit, West Lafayette, IN

March 1, 2016
February 29, 2016
February 28, 2016
January 18, 2016
December 4, 2015

IsoLate: A Type System for Self-Recursion

ESOP, London, UK

April 14, 2015

Late Typing for Loosely Coupled Recursion

Dagstuhl, "Foundations of Scripting Languages," Wadern, Germany

June 30, 2014

Modern Type Systems for Dynamic Languages

Samsung Research, San Jose, CA
Purdue University, West Lafayette, IN
Swarthmore College, Swarthmore, PA
University of Chicago, Chicago, IL

April 22, 2014
April 17, 2014
March 28, 2014
March 14, 2014

A Fix for Dynamic Scope

OOPSLA PC Meeting, UCLA, Los Angeles, CA
ML Workshop, Boston, MA

May 14, 2014
September 22, 2013

Nested Refinement Types for JavaScript

Northeastern University, Boston, MA
University of California, San Diego, CA (Dissertation Defense)
University of California, San Diego, CA (Thesis Proposal)

September 30, 2013
September 3, 2013
November 16, 2011

Static Verification for Web Scripting Languages

University of Washington, Seattle, WA
Microsoft Research, Cambridge, UK
Microsoft Research, Redmond, WA
University of Texas, Austin, TX
IBM Research, Yorktown Heights, NY
University of Michigan, Ann Arbor, MI
Georgetown University, Washington, DC
Oregon State University, Corvallis, OR

April 18, 2013
April 9, 2013
April 3, 2013
March 19, 2013
March 14, 2013
February 28, 2013
February 25, 2013
February 13, 2013

Refinement Types for JavaScript Security

Brown University, Providence, RI
Rutgers University, New Brunswick, NJ

January 28, 2013
January 23, 2013

Dependent Types for JavaScript

HCSS, Annapolis, MD
SoCal, Riverside, CA
OOPSLA, Tucson, AZ
Dagstuhl, "Web Application Security," Wadern, Germany
JSTools, Beijing, China
STOP, Beijing, China

May 7, 2013
November 30, 2012
October 24, 2012
October 2, 2012
June 13, 2012
June 11, 2012

Nested Refinements: A Logic for Duck Typing

POPL, Philadelphia, PA
Dagstuhl, "Foundations of Scripting Languages," Wadern, Germany
SoCal, La Jolla, CA

January 26, 2012
January 4, 2012
December 3, 2011

Type Inference with Run-time Logs

STOP, Austin, TX
Kyoto University, Kyoto, Japan
SoCal, Los Angeles, CA

January 29, 2011
January 17, 2011
December 4, 2010

Fine + DCIL: End-to-end Verification of Security Enforcement

Microsoft Research, Redmond, WA

August 7, 2009

Staged Information Flow for JavaScript

PLDI, Dublin, Ireland

June 16, 2009

Teaching Experience

University of Chicago

Honors Introduction to Computer Science I (undergraduate)	Fall 2014, 2015, 2016, 2017, 2018, 2020
Functional Programming (undergraduate)	Winter 2015, 2016, 2021, Spring 2017, 2019, 2020
Creative Coding (undergraduate)	Spring 2021
Introduction to Creative Coding (high school: Pre-College Immersion)	Summer 2021
Art with Science: Creative Coding (high school: Collegiate Scholars Program)	Summer 2021
Topics in PL: User Interfaces for Programming Languages (graduate)	Spring 2020
Topics in PL: Bidirectional Programming and Synthesis (graduate)	Spring 2019
Topics in PL: Direct Manipulation Programming (graduate)	Spring 2018
Topics in PL: Program Synthesis (graduate)	Spring 2017
Topics in PL: Program Synthesis (graduate)	Spring 2016
Topics in PL: Types and Contracts (graduate)	Spring 2015

University of California, San Diego

Programming Languages: Principles and Paradigms (undergraduate)	Winter 2014
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University of Pennsylvania

Hardware and Software Algorithms (high school; co-instructor)	Summer 2007
C# Programming (undergraduate; unofficial instructor)	Spring 2007

Mentoring Experience

Current Ph.D. Advisees

Nick Collins	2018 – present
Brian Hempel	2015 – present
Andrew McNutt	2020 – present

Current Undergraduate Advisees

Anton Outkine	2021 – present
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Former Postdoctoral Advisees

Mikaël Mayer	CTO, Tharzen (startup)	2017 – 2020
Cyrus Omar	Assistant Professor, University of Michigan	2017 – 2019

Former Undergraduate Advisees

Jacob Albers		2015
Grace Lu	Deuce: Direct Manipulation Source Program Editor (BS Thesis)	2017
Justin Lubin	Forging Smyth: Program Sketching with Live Bidirectional Eval. (BS Thesis)	2017 – 2020
Izaak Meckler	Mote: Goal-Driven Development and Synthesis for Haskell (BS Thesis)	2015
Eri Rogers		2017
Amy Sitwala		2016
Mitchell Spradlin		2015
Bowen Wang	Predicting Haskell Type Signatures from Names (BS/MS Thesis)	2015 – 2018
Chris Winkler		2018
John Zhao		2016

Student Awards

Justin Lubin	NSF Graduate Research Fellowship (GRFP)	2020
Brian Hempel	UIST Best Demo Honorable Mention	2019

Professional Service

Organizing Committees

Programming Language Design and Implementation (Sponsorship Co-chair)	PLDI 2022
Programming Language Design and Implementation (Sponsorship Co-chair)	PLDI 2021
Systems, Programming, Languages and Applications: Software for Humanity (Local Chair)	SPLASH 2020 2021
Workshop on Synthesis (Co-chair)	SYNT 2020
Programming Language Design and Implementation (Artifact Evaluation Co-chair)	PLDI 2019
Live Programming Workshop (Co-organizer)	LIVE 2018
International Conference on Functional Programming (Student Research Competition Chair)	ICFP 2018
Programming Language Design and Implementation (Artifact Evaluation Co-chair)	PLDI 2018
Midwest PL Summit (Co-organizer)	MWPLS 2016

Editorial Boards

Journal of Functional Programming	JFP 2020 – present
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Program Committees

Workshop on Bidirectional Transformations	Bx 2020 2021
Programming Language Design and Implementation	PLDI 2021
Art, Science, and Engineering of Programming	<Programming> 2021
Principles of Programming Languages	POPL 2021
Live Programming Workshop	LIVE 2020
Workshop on Human Aspects of Types and Reasoning Assistants	HATRA 2020
Onward! Conference	Onward! 2019
Live Programming Workshop	LIVE 2019
Workshop on Bidirectional Transformations	Bx 2019
Art, Science, and Engineering of Programming	<Programming> 2019
Workshop on Evaluation and Usability of Programming Languages and Tools	PLATEAU 2018
Programming Experience Workshop	PX/18
Live Programming Workshop	LIVE 2017
Programming Language Design and Implementation	PLDI 2017
Trends in Functional Programming	TFP 2016
European Conference on Object-Oriented Programming	ECOOP 2016
Script to Program Evolution Workshop	STOP 2015
Principles of Programming Languages	POPL 2015
Object-Oriented Programming Languages, Systems, and Applications	OOPSLA 2014
Foundations of Object-Oriented Languages	FOOL 2013

External Review Committees

Programming Language Design and Implementation	PLDI 2016
Object-Oriented Programming Languages, Systems, and Applications	OOPSLA 2015
Programming Language Design and Implementation	PLDI 2014

Student Research Competition Committees

Principles of Programming Languages	POPL 2016
Programming Language Design and Implementation	PLDI 2015

Artifact Evaluation Committees

Programming Language Design and Implementation	PLDI 2014
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External Reviews

Human Factors in Computing	CHI 2020, 2021
Conference and Exhibition on Computer Graphics and Interactive Techniques in Asia	SIGGRAPH ASIA 2019
User Interface Software and Technology	UIST 2018, 2019
Principles of Programming Languages	POPL 2014, 2016
Object-Oriented Programming Languages, Systems, and Applications	OOPSLA 2011
European Symposium on Programming	ESOP 2011
Compiler Construction	CC 2009

Journal Article Reviews

Transactions on Programming Languages and Systems	TOPLAS 2013, 2014, 2019
Transactions on Computational Logic	TOCL 2019
New Generation Computing	2015

Grant Proposal Panels and Reviews

National Science Foundation	2015, 2017, 2019, 2020, 2021
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Board Memberships

Elm Software Foundation	2017 – present
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Talk Selection Committees

Elm in the Spring Conference	2019
Elm Conference	elm-conf 2018

University Service

Doctoral Thesis Committees

Nick Collins		Expected 2024
Andrew McNutt		Expected 2023
Brian Hempel		Expected 2021
Junwen Yang	Advisor: Shan Lu	
Joe Wingerter	Advisor: John Reppy	
Kavon Farvardin	Advisor: John Reppy	2020
Yuxi Chen	Advisor: Shan Lu	2019
Mikaël Mayer (EPFL)	Advisor: Viktor Kunčák	2017
Tanakorn Leesatapornwongsa	Advisor: Haryadi Gunawi	2017
Lamont Samuels	Advisor: John Reppy	2016

Masters Thesis Committees

Nick Collins		2020
Valerie Zhao	Advisor: Blase Ur	2020
Chi Li	Advisor: Shan Lu	2019
Nathan Mull	Advisor: Stuart Kurtz	2019
Arthur Vale	Advisor: Stuart Kurtz	2019
Lefan Zhang	Advisor: Shan Lu	2019
Brian Hempel		2018
Bowen Wang		2018
Junwen Yang	Advisor: Shan Lu	2018
Guangpu Li	Advisor: Shan Lu	2017
Joe Wingerter	Advisor: John Reppy	2017
Kavon Farvardin	Advisor: John Reppy	2017
Austin Byers	Advisor: Ari Feldman	2016
Tanakorn Leesatapornwongsa	Advisor: Haryadi Gunawi	2014

Senior Thesis Advisees

Justin Lubin		2020
Grace Lu		2017
Izaak Meckler		2015

University Award Committees

Liew Family College Research Fellows		2017
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